



## Glenn T. Seaborg Center Seminar

# Reactions and Transport of U(VI) After a Major Waste Liquid Spill in the Hanford Site Vadose Zone

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4:00 - 5:00 pm  
Building 70A, Room 3377**

An alkaline brine containing a high concentration of U(VI) spilled in 1951, leaving 10 metric tons of U in the unsaturated sediments under tank BX-102 at the Hanford Site, and some of the U has migrated to the groundwater. To understand how the waste plume evolved geochemically over time and distance, we simulated the spilling event in laboratory, using a newly developed sectioning-column method, and following up with aging. New findings include the following: (1) The pH values of the waste plume decreased as much as 4 units at the plume front, and an explanation for the observed pH profiles from borehole sediment samples was obtained. (2) Massive amounts of colloids formed at the plume front including true U(VI) colloids, resulting in U concentrations exceeded the source concentration by up to 5-fold in the plume front region. (3) Retardation of U(VI) by the sediment is highly kinetically limited, so U(VI) has the tendency to preferentially reside within the low permeability zones. (4) A surprisingly high U concentration (0.022 M) was found in the mobile plume liquid phase under equilibrium conditions. This may have explained the unpredicted but field-observed deep migration of U. (5) U(VI) speciation varies with location along the plume flow path, reflecting local geochemical conditions.